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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/683,606 | 10/09/2003 | Garo J. Derderian | 108298738US | 1013 |

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| EXAMINER | |
|---|---|
| TUROCY, DAVID P | |
| ART UNIT | PAPER NUMBER |
| 1762 | |

DATE MAILED: 05/31/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

|  | Application No. | Applicant(s) |  |
|---|---|---|---|
| ***Office Action Summary*** | 10/683,606 | DERDERIAN, GARO J. |  |
|  | **Examiner** | **Art Unit** |  |
|  | David Turocy | 1762 |  |

***-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --***

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *14 March 2006*.
2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-6,8-11 and 13-23* is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-6,8-11 and 13-23* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a)☐ All b)☐ Some * c)☐ None of:
1.☐ Certified copies of the priority documents have been received.
2.☐ Certified copies of the priority documents have been received in Application No. _____.
3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
4)☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application (PTO-152)
6)☐ Other: _____.

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 3/14/06 has been entered.

### *Response to Amendment*

2. Applicant's amendment, filed 3/14/06, have been fully considered and reviewed by the examiner. The examiner notes the amendment to the claims 1, 5, 6, 8, 11, 14, 15 and 19-21 and the subsequent cancellation of claims 7 and 24. Claims 1-6, 8-11, and 13-23 are pending.

### *Response to Arguments*

3. Applicant's arguments with respect to claims have been considered but are moot because the arguments are directed to newly added limitations not present at the time of the final rejection. Rejections to the claims as amended follow.

### *Claim Rejections - 35 USC § 112*

4. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 11, 13-18 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claim 11 includes the added limitations "changing the residual film...at a temperature of at least 400°C" which appears to be new matter. The examiner cannot locate support for such a temperature range, inclusive of all temperature above 400°C, in the specification. If the applicant can provide support for the range, in the originally filed disclosure, then the examiner will withdraw the rejection.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 5, 6, 8 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

A broad range or limitation together with a narrow range or limitation that falls within the broad range or limitation (in the same claim) is considered indefinite, since the resulting claim does not clearly set forth the metes and bounds of the patent protection desired. See MPEP § 2173.05(c). Note the explanation given by the Board of Patent Appeals and Interferences in *Ex parte Wu*, 10 USPQ2d 2031, 2033 (Bd. Pat. App. & Inter. 1989), as to where broad language is followed by "such as" and then narrow language. The Board stated that this can render a claim indefinite by raising a question or doubt as to whether the feature introduced by such language is (a) merely exemplary of the remainder of the claim, and therefore not required, or (b) a required feature of the claims. Note also, for example, the decisions of *Ex parte Steigewald*, 131 USPQ 74 (Bd. App. 1961); *Ex parte Hall*, 83 USPQ 38 (Bd. App. 1948); and *Ex parte Hasche*, 86 USPQ 481 (Bd. App. 1949). In the present instance, claim 5,6, and 8 (all dependant on claim 1), recites the broad recitation including the relationship between the deposition and maintenance temperatures, and the claims also recites deposition temperature approximately equal to the maintenance temperature which is the narrower statement of the range/limitation.

6. Claims 19-23 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The preamble of the claim recites “atomic layer deposition process” and the body of the claim recites “plasma vapor deposition process”. The claim fails to recite positive steps associated with the atomic layer deposition process, whereas the claimed step in the claim are recited basic plasma deposition steps and are clearly not limited to an ALD process, and therefore it is unclear what the applicants regard as the claimed subject matter.

However, for the purposes of applying art, the examiner, after cursory review of the specification will regard the "plasma vapor deposition process" to be limited to pulsing gases into a reactor to form a plasma as described in paragraph 0028 of the specification as originally filed.

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 1-6 and 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted state of the art ("ASA") as taught by the applicants description in view of Japanese Patent Abstract JP 63111177A by Mochizuki et al., hereafter Mochizuki.

ASA teaches a known method depositing conductive material includes plasma CVD, including plasma processing vessel and a microwave transmitting window (Paragraph 0005). ASA discloses the microwaves enter through the window and into the process chamber and produce plasma to depose the metal onto the workpiece (0006). ASA discloses depositing a conductive material onto the workpiece results in a secondary deposit of metal on the interior surface of the window and the secondary deposit builds up as successive workpieces are processed (0006). Therefore ASA discloses that it is known in the art to place a microfeature workpiece in the reaction chamber, inject gas into the chamber, generate a plasma within the chamber and depositing an electrically conductive material, which inherently has a first transmissivity, on the surface of the window and the workpiece and repeat the process with other workpieces (0005-0006).

However, ASA fails to disclose transforming the conductive material on the window into a substantially dielectric material.

However, Mochizuki teaches a method of cleaning the interior of a chamber by converting a film deposited on the window into a dielectric material (Abstract). Mochizuki discloses a secondary film stuck on the window is converted into a dielectric material to prevent reduction of efficiency of the microwave (Abstract). Mochizuki teaches of converting the deposited film to an oxide. Mochizuki clearly suggests injecting a fluid comprising oxygen into the vapor reaction chamber (see figures); see injection (15) directed at window (11). Mochizuki discloses transforming the secondary film while the film is thin, and therefore the teaching of Mochizuki reasonably suggests to one of ordinary skill in the art to convert a secondary film to a dielectric material, which remains on the window without decreasing the efficiency of the microwave.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the ASA to convert the conductive material deposited on the window into a dielectric material as suggested by Mochizuki to provide a desirable cleaning of a deposition chamber to reap the benefits of providing cleaning of a plasma process while the efficiency of microwaves is prevented from being lowered.

The admitted state of the art in view of Mochizuki fails to disclose the temperature, relative to the deposition temperature, at which to perform the transformation of metal to oxide. However, It is the examiners position that the process parameters of temperature is a known result effective variable. If the temperature is too low it would result in insufficient conversion to a dielectric material and too high a temperature would result in no added benefits of increase conversion.
Therefore it would have been obvious to one skill in the art at the time of the invention was made to determine the optimal value for the conversion temperature used in the process of the admitted state of the art in view of Mochizuki, through routine experimentation including a temperature equal to the deposition temperature, to efficiently and effectively convert the secondary film to a dielectric material. Alternatively, "differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical." (MPEP 2144.05.II.A.)

Claim 3: Mochizuki discloses using a source gas comprising $WF_6$ and clearly discloses depositing a film comprising tungsten or Aluminum (Page 3, Left Column).

Claims 9 and 10: The admitted state of the art in view of Mochizuki fails to disclose concurrently or intermittently flowing the process gases into the plasma chamber. It is the examiners position that intermittent and concurrent gas flow is known in the art and would have been obvious to one of ordinary skill in the art use either intermittent or concurrent precursor gas flow to provide the gases into a chamber during a plasma coating operation.

9. Claims 11 and 13-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over ASA in view of Mochizuki as applied above and further in view of Japanese Patent Abstract 63020490 by Nakada, hereafter Nakada.

ASA in view of Mochizuki is applied here as applied above, in addition ASA discloses conductive films are deposited on the inner surface of the chamber and Mochizuki discloses metal films during deposition using plasma will stick to the window and inhibit microwave energy into the chamber (page 5), however, the references fail to teach of transforming titanium metal deposited on the metal to titanium oxide.

However, Nakada discloses, during vapor deposition process for depositing films such as tungsten or titanium, a portion of the metal film will stick to the inner surface of the chamber walls. Nakada additionally discloses titanium on the walls can be converted into an oxide film.

Therefore, taking the reference collectively, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify ASA in view of Mochizuki to convert titanium on the windows to titanium oxide as suggested by Nakada to provide a desirable cleaning of the chamber walls during film deposition because ASA in view of Mochizuki discloses conductive materials are known to be deposited on windows during vapor deposition and Nakada discloses titanium is known in the art to deposit on the chamber walls and then subsequently converted to an oxide. Please note that the test of obviousness is not an express suggestion of the claimed invention in any or all references, but rather what the references taken collectively would suggest to those of ordinary skill in the art presumed to be familiar with them (*In re Rosselet*, 146 USPQ 183). Alternatively, one would reasonably expect success in modifying the process of ASA in view of Mochizuki to transform a titanium film deposited on the window into a titanium oxide because Nakada discloses supplying oxygen gas into the chamber will effectively transform titanium into titanium oxide. The prior art can be modified or combined to reject claims as prima facie obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375.

10. Claims 19-23 are rejected under 35 U.S.C. 103(a) as being unpatentable over ASA in view of Mochizuki and Nakada and further in view of US Patent 6689220 by Nguyen, hereafter Nguyen.

ASA in view of Mochizuki and Nakada are applied here as applied above but the references fail to discloses a atomic layer deposition process as required by the preamble in combination with a plasma chemical vapor deposition process.

However, Nguyen discloses a process system for depositing highly controlled film on a workpiece discloses using a plasma enhanced atomic layer deposition process, including supplying, during the PEALD process, intermittent or continuous flow of precursor gases into the process (Abstract, Column 2, lines 39-40, column 4, lines

28-30). Nguyen discloses using microwaves to provide energy into system to form a plasma (Column 2, lines 64).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify ASA in view of Mochizuki and Nakada to use the plasma enhanced atomic layer deposition process with a reasonable expectation of success as suggested by Nguyen to provide a desirable layer deposition on a workpiece to reap the benefit of providing a highly controlled layered film as taught by Nguyen. The prior art can be modified or combined to reject claims as prima facie obvious as long as there is a reasonable expectation of success. *In re Merck & Co., Inc.*, 800 F.2d 1091, 231 USPQ 375.

## ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to David Turocy whose telephone number is (571) 272-2940. The examiner can normally be reached on Monday-Friday 8:30-6:00, No 2nd Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

David Turocy
AU 1762

**TIMOTHY MEEKS**
**SUPERVISORY PATENT EXAMINER**